

## KARAKTERISASI SENYAWA $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$ DENGAN ( $x=0$ ; 0,001; 0,025; 0,05; DAN 0,1)

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### ABSTRAK

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Penelitian ini bertujuan mempelajari karakter senyawa  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  dengan  $x=0$ ; 0,001; 0,025; 0,05; dan 0,1.

Subjek penelitian ini adalah  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  dan objeknya adalah karakterisasi  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$ . Sintesis material telah dilakukan oleh Chanel (2013) dengan metode keramik serta karakterisasi XRDnya. Karakterisasi pada penelitian ini yaitu SEM/EDX, spektroskopi UV/Vis, porosimetri, dan spektroskopi FTIR. Uji adsorpsi pada keadaan gelap dilakukan dengan mencampurkan katalis  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  ditambahkan larutan metilen biru dengan variasi konsentrasi yang beragam.

Hasil penelitian menunjukkan bahwa partikel  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  cenderung membentuk agregat antara 0,5–1,5  $\mu\text{m}$  untuk  $x=0$  dan antara 0,5–1,0  $\mu\text{m}$  untuk  $x=0,001$ ; 0,025; 0,05 dan 0,1. Spektra EDX menunjukkan perbandingan komposisi senyawa mendekati komposisi secara teoritis.  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  memiliki energi celah pita 3,79- 4,23 eV untuk daerah Eg 1, serta 2,68- 3,38 eV untuk daerah Eg 2. Spektra FTIR dengan matrik Nujol mull menunjukkan daerah serapan disekitar 412  $\text{cm}^{-1}$  dan 446  $\text{cm}^{-1}$  pada setiap variasi senyawa  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$ . Analisis Porosimetri luas permukaan paling besar ditunjukkan oleh  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  variasi  $x=0,025$  sebesar 8,2681  $\text{m}^2/\text{g}$ . Uji adsorpsi pada keadaan gelap katalis  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  mengikuti pola isotherm Freundlich. Jumlah kapasitas adsorpsi untuk masing-masing katalis  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  ( $x=0$ ; 0,001; 0,025; 0,05; dan 0,1) berturut-turut 0,41908296; 0,00097701; 0,00050327; 0,00120615; dan 0,00051761 mol/gram.

**Kata Kunci:** Adsorpsi,  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$ , karakter

# CHARATERIZATION OF $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$ WITH ( $x=0$ ; 0,001; 0,025; 0,05; AND 0,1)

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## ABSTRACT

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This research aims to find out the character of compound with chemical formula  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  with  $x=0$ ; 0.001; 0.025; 0.05; and 0.1.

The subject of the study was  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  and the object was the characterization of  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$ . Chanel (2013) synthesized the materials using standard ceramic method and the chemical phase analysis by X-Ray Diffraction (XRD) method. Some characterizations were determined by the use of SEM/EDX, UV/Vis (Diffuse Reflectance) spectroscopy, porosimetry technique, and FTIR spectroscopy. Adsorption test was conducted in the dark by mixing  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  with varying concentrations of methylene blue solution.

The research found that  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  particle tend to form aggregates between 0.5 to 1.5  $\mu\text{m}$  at  $x=0$  and between 0.5 to 1.0  $\mu\text{m}$  at  $x=0$ ; 0.001; 0.025; 0.05 and 0.1. EDX spectra showed that its composition ratio is nearly similar with the theoretically predicted one. UV-Vis Spectroscopy analysis identified 3,79- 4,23 eV of Eg 1 and 2,68- 3,38 eV of Eg 2 band gap for  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$ . FTIR spectra obtained using Nujol mull discovered the regions of absorption of around  $412\text{ cm}^{-1}$  and  $446\text{ cm}^{-1}$  in each  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  variation. Porosimetry analysis revealed the largest surface area was  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  at  $x=0.025$ , it was found around  $8.2681\text{ m}^2/\text{g}$ . Adsorption test of the  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  catalyst in the dark was carried out after the Freundlich isotherm. It was established that the amount of adsorption capacity for each  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$  catalyst ( $x=0$ ; 0.001; 0.025; 0.05; and 0.1) respectively is; 0.41908296; 0.00097701; 0.00050327; 0.00120615; and 0.00051761 mol/gram.

**Keywords:** *Adsorption,  $\text{Ca}_{1-x}\text{Co}_x\text{TiO}_3$ , Character*